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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/878,946	06/13/2001	Masahiko Kubota	35.C15453	3562

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NEW YORK, NY 10112

EXAMINER

LIANG, LEONARD S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/878,946

Applicant(s)

KUBOTA ET AL.

Examiner

Leonard S Liang

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 47-50, 53, 54, 56 and 58-63 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

- 5) ☒ Claim(s) 47-50 is/are allowed.

- 6) ☒ Claim(s) 53, 54, 56 and 58-61 is/are rejected.

- 7) ☒ Claim(s) 62 and 63 is/are objected to.

- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 03 September 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

2. Claim 60 objected to because of the following informalities: Claim 60 states "A liquid ejection recording apparatus...the liquid container according to any one of claims 53 to 59..." However, because claims 55 and 57 have been canceled, this is no longer a proper statement. It will be construed that the claim should state "A liquid ejection recording apparatus...the liquid container according to any one of claims 53-54, 56, and 58-59..." Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 53-54 and 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al (US Pat 5509140) in view of Maurelli et al (US Pat 6099101) and Arai et al (US Pat 5179389).

Koitabashi et al discloses :

Art Unit: 2853

- {claim 53} a liquid container in which an ink to be supplied to a liquid ejection head for ejecting a liquid droplet is contained (See figures 1 and 55; column 1, lines 5-15); a first chamber which is partially connected to atmosphere and in which an absorber for absorbing a liquid is contained (See figure 15, references 3, 4, 13 and figure 55, reference 4004; column 20, lines 32-49); a second chamber which is closed from the outside and in which liquid is contained (See figure 15, references 6 and 9 and figure 55, reference 4006); a connection path, disposed in the vicinity of a bottom portion of the container, for connecting the first chamber to the second chamber (See figures 15 and 55, reference 8); a supply port which is disposed in the first chamber and via which the liquid is supplied to the liquid ejection head (See figure 15, reference 10 and figure 55); a first monitor means, disposed in the first chamber for monitoring a liquid amount of the first chamber (See figure 55, reference 4100; column 31, lines 23-53);

U.S. Patent Apr. 16, 1996 Sheet 37 of 45 5,509,140

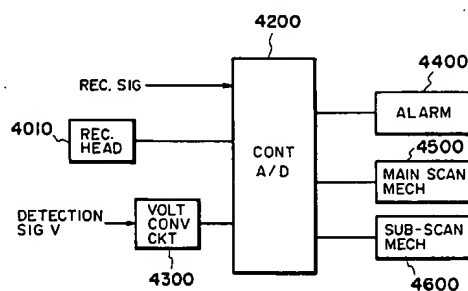


FIG. 54

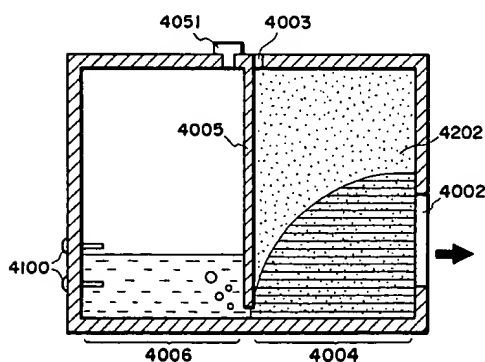


FIG. 55

Art Unit: 2853

and a flow rate adjustment apparatus (in the form of a absorbing material acting as a valve), disposed in the connection path for adjusting a flow rate of the connection path (See figures 19-20, references 3, A201; column 17, lines 54-67; column 18, lines 1-9).

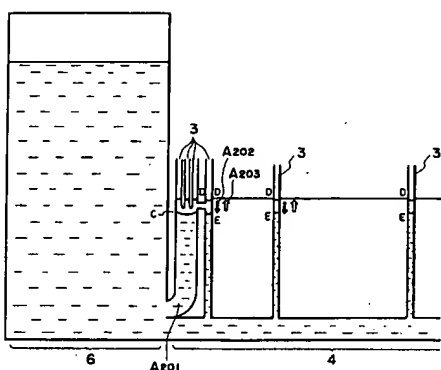


FIG. 20

U.S. Patent
Apr. 16, 1996
Sheet 17 of 45
5,509,140

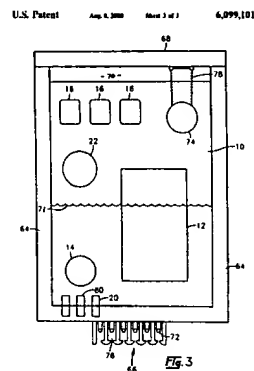
Koitaabashi et al differs from the claimed invention in that it does not disclose:

- {claim 53} a first monitor means comprising a first solid semiconductor element which includes: at least pressure detection means for detecting a pressure fluctuation of the liquid; information communicating means for transmitting pressure information obtained by the pressure detection means; and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the pressure detection means and the information communicating means; and the flow rate adjustment apparatus is a second solid semiconductor element comprising: at least receiving means for receiving the pressure information transmitted from the first monitor means; an open/close valve which operates in response to the received pressure information; and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.

- {claim 54} the second monitor means for monitoring the liquid amount of the second chamber is disposed in the second chamber, and the flow rate adjustment apparatus is controlled in accordance with the information from the second monitor means.
- {claim 59} the solid semiconductor element floats on a liquid surface or in the liquid.
- {claim 60} a liquid ejection head for ejecting a recording liquid droplet
- {claim 61} the liquid ejection head utilizes a film boiling caused when the heat energy is applied to the liquid to eject the liquid droplet via a nozzle.

Maurelli et al discloses:

- {claim 53} a first monitor means comprising a first solid semiconductor element (figure 3, reference 74);



information communication means for transmitting information (column 6, lines 58-67); the flow rate adjustment apparatus is a second solid semiconductor element (figure 3, reference 14); an open/close valve (column 3, lines 54-56; Maurelli et al teaches that a sensor disables nozzle resistors (i.e. turning ink flow off) when a print head cartridge has been opened...but once the printhead cartridge is closed, the sensor will re-enable the nozzle resistors (i.e. turning ink flow back on. Hence, the disclosed sensor acts as an on/off valve for flow control); information receiving means (column 6, lines 58-67).

- {claim 59} the semiconductor element floats in the liquid (figure 3, reference 14)
- {claim 60} a liquid ejection head for ejecting a recording liquid droplet (figure 3, reference 66)

Arai et al discloses:

- {claim 53} pressure detection means for detecting a pressure fluctuation of the liquid (figure 2, reference 30; column 4 lines 39-53); energy converting means for converting an energy applied from the outside to an energy different from the applied energy (in the form of converting between pressure and electrical signals) to operate the pressure detection means and the information communicating means (column 4, lines 39-54)
- {claim 61} film boiling caused when the heat energy is applied to the liquid to eject the liquid droplet via a nozzle (column 7, lines 56-62)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Maurelli et al into the invention of Koitabashi et al so that there is a first monitor means comprising a first semiconductor element; a flow rate adjustment apparatus, which is a second solid semiconductor element; the semiconductor element floats in the liquid; and there is a liquid ejection head for ejecting a recording liquid droplet. The motivation for the skilled artisan in doing so is to gain the benefit of monitoring the liquid container to make sure it has not been disabled or tampered with (column 3, lines 44-47).

It would have been further obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Arai et al into the invention of Koitabashi et al as modified by Maurelli et al so that the first monitor means includes pressure detection means; information communicating means for transmitting pressure information obtained by the pressure detection means; energy converting means for converting an energy applied from the outside to an energy different from the applied energy; and the flow rate adjustment apparatus comprises receiving means; an open close

Art Unit: 2853

valve; energy converting means; and there is film boiling caused when the heat energy is applied to the liquid to eject the liquid droplet via a nozzle. The motivation for the skilled artisan in doing so is to gain the benefit of detecting head pressure and regulating the drive condition of energy generating members according to the detected head pressure (column 3, lines 37-51), in order to properly discharge ink. The combination of Koitabashi et al in view of Maurelli et al and Arai et al naturally suggests that the second monitor means for monitoring the liquid amount of the second chamber is disposed in the second chamber, and the flow rate adjustment apparatus is controlled in accordance with the information from the second monitor means.

4. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al (US Pat 55091540), in view of Maurelli et al (US Pat 6099101) and Arai et al (US Pat 5179389) as applied to claim 53 above, and further in view of Ahn (US Pat 5956061).

Koitabashi et al, in view of Maurelli et al and Arai et al differs from the claimed invention in that it does not explicitly disclose that the first semiconductor element is disposed above a liquid surface of the first chamber when a liquid supply to the first chamber from the second chamber is possibly interrupted, and in a position in which a pressure fluctuation can be detected.

Ahn does disclose, with respect to claim 56, a sensing element disposed above a liquid surface (See figure 2, references 30 and 32; column 4, lines 51-65).

U.S. Patent Sep. 21, 1999 Sheet 2 of 5 5,956,061

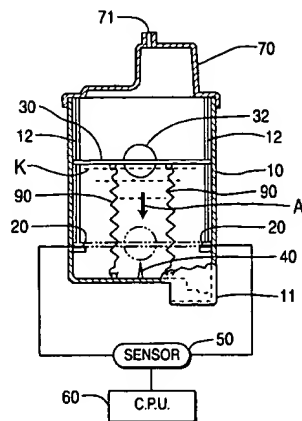


FIG. 2

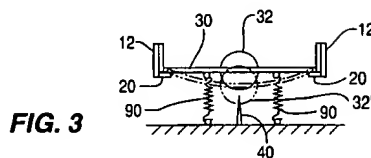


FIG. 3

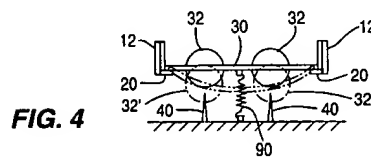


FIG. 4

Furthermore, Maurelli et al teaches, with respect to claim 56, "It should be understood that a variety of sensor 14 and 74 placements and configurations could be implemented to prevent the premature disabling of the nozzle resistors 72 and the particular configuration of FIG. 3 is described for illustration purposes only." (See figure 3, references 14, 72, 74; column 2, lines 5-10) This gives motivation for configuring and positioning the semiconductor element in a variety of ways.

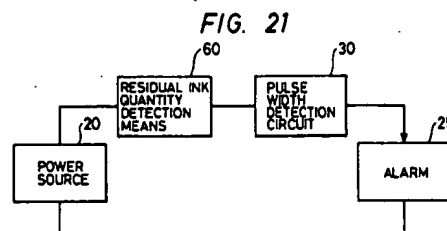
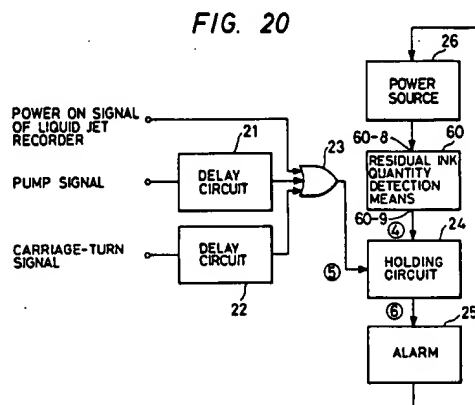
It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teachings of Ahn to the invention of Koitabashi et al, in view of Maurelli et al and Arai et al, by configuring the first solid semiconductor element so that it is disposed above a liquid surface of the first chamber when a liquid supply to the first chamber from the second chamber is possibly interrupted. The motivation for the skilled artisan in doing so is to gain the benefit of being able to detect pressure fluctuation in this position (as taught above by Maurelli).

5. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al (US Pat 5509140), in view of Maurelli et al (US Pat 6099101) and Arai et al (US Pat 5179389), as applied to claim 53 above, and further in view of Iida et al (US Pat 5136309).

Koitabashi et al, in view of Maurelli et al and Arai et al differs from the claimed invention in that it does not explicitly disclose that the second monitor means is a third solid semiconductor element comprising: at least residual amount detection means for detecting a liquid residual amount; information communicating means for transmitting residual amount information obtained by the residual amount detection means to the flow rate adjustment apparatus; and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the residual amount detection means and the information communicating means.

Iida et al discloses, with respect to claim 58, residual ink quantity detection means (See figure 21, reference 60; column 1, lines 12-35).

U.S. Patent Aug. 4, 1992 Sheet 13 of 17 5,136,309



In light of the teaching of Koitabashi et al, in view of Maurelli et al and Arai et al, that a first monitor means is a first semiconductor element, it would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the second monitor means to be a third solid semiconductor element. The motivation for the skilled artisan in doing so is to gain the advantage of being able to measure liquid level within the second chamber; measuring liquid level is useful in determining when the useful life of a ink jet print head cartridge has expired (See Maurelli et al column 1, lines 10-11).

It would have been further obvious to one having ordinary skill in the art at the time the invention was made to apply the teachings of Iida to the invention of Koitabashi et al, in view of Maurelli et al and Arai et al, in order to configure the solid semiconductor element so that it could detect residual amount as well as liquid level and pressure fluctuation. The motivation for the skilled artisan in doing so is to gain the advantage of being able to measure the residual amount of the liquid in order to prevent print errors due to ink shortage (See Iida et al column 1, lines 29-32). As such, it would have also been obvious to adjust the information communicating means disclosed by Koitabashi et al, in view of Maurelli et al and Arai et al, so that the information communicating means could also transmit residual amount information obtained by the residual amount detection means to the flow rate adjustment apparatus.

It would have been still further obvious to adjust the energy converting means disclosed by Koitabashi et al, in view of Maurelli et al and Arai et al, in order to convert an energy applied from the outside to an energy different from the applied energy to operate the residual amount detection means and the information communicating means. The motivation for the skilled artisan in doing so is to gain the benefit of being able to use the residual amount detection and information communicating means disclosed above; it is inherent to the invention that the pressure detection and information communication means need energy in order to operate correctly.

Allowable Subject Matter

6. Claims 47-50 are allowed.

The following is an examiner's statement of reasons for allowance: The primary reason for the allowance of claim 47 is the inclusion of the limitations of "wherein a gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the solid semiconductor element, and the floating solid semiconductor element rocks stably without rotating in the liquid" and

“wherein a metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element.” It is these limitations found in each of the claims, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes these claims allowable over the prior art.

Claim 48 depends from allowed claim 47.

Claims 49-50 depend from allowed claim 48.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

7. Claims 62-63 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 62 states “The liquid container... wherein a gravity center of the solid semiconductor element floating in the liquid is positioned below a center of the element, and the floating solid semiconductor element rocks stably without rotating in the liquid, “which was not found, taught, or suggested in the prior arts.

Claim 63 states “The liquid container... wherein a metacenter of the solid semiconductor element is constantly positioned above the gravity center of the solid semiconductor element,” which was not found, taught, or suggested in the prior arts.

Response to Arguments

8. Applicant's arguments filed on 09/03/02 have been fully considered but they are not persuasive. The applicant's arguments have been addressed in the above rejection to amended claims.

The applicant previously asserted that “Koitabashi is only seen to teach that absorbing material 4202 can be refilled continuously with ink. (Koitabashi, Figure 20; and column 31, lines 54 to 58). The absorbing material of Koitabashi is not seen to be a flow rate adjustment apparatus disposed in the connection path between the two chambers, much less a flow rate adjustment apparatus that is a solid semiconductor as in amended independent claim 53.” However, Koitabashi discloses “On the other hand, the liquid surface in the absorbing material rises because of the ink absorbed from the ink container, so that the liquid surface D is established, and the air-liquid exchange stops. In this state, there is no ink in the air introduction passage A201, and the absorbing material above the air introduction passage in the model, functions simply as a valve. If the ink is consumed again in this state, the liquid surface in the absorbing material lowers slightly, which corresponds to opening of the valve, so that the air-liquid exchange occurs at once to permit consumption of the ink from the ink container 6. Upon completion of the ink consumption, the liquid surface of the absorbing material rises due to the capillary force of the absorbing material. When it reaches the position D, the air-liquid exchange stops, so that the liquid surface is stabilized at that position.” (column 17, lines 54-67; column 18, lines 1-9). This clearly shows Koitabashi et al acting as a flow rate adjustment apparatus.

The applicant also asserted that “nowhere is Maurelli seen to disclose or suggest control of the flow rate in the connection path by using a flow rate adjustment apparatus disposed in the connection path for adjusting a flow rate of the connection path in accordance with information from the first monitor means, wherein the flow rate adjustment apparatus is a solid semiconductor element including at least receiving means for receiving the pressure information transmitted from the first monitor means, an open/close valve which operates in response to the received pressure information, and energy converting means for converting an energy applied from the outside to an energy different from the applied energy to operate the receiving means and the open/close valve.” However, as shown in the above rejection, Maurelli does indeed suggest control of flow rate in the sense that flow rate is turned off when a print

head cartridge is opened and the flow rate is turned back on when the print head cartridge is closed again (column 3, lines 54-57).

Finally, the applicant asserted that the alleged combinations asserted in the examiner's first Office Action were based on impermissible hindsight, but does not cite a specific case of where this impermissible hindsight was used. Without affirming the validity of this assertion, the examiner submits that in the rejection above, there is no use of impermissible hindsight.

Final Rejection

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sumitomo (US Pat 4422085) discloses an ink jet viscosity control in an ink liquid supply system for an ink jet system printer.

Chocholaty (US Pat 4130126) discloses an ink maintenance sensor.

Walker (US Pat 6312074) discloses a method and apparatus for detecting fluid level in a fluid container.

Ahn (US Pat 5956061) discloses an ink supplementing device and method of ink cartridge in printing apparatus.

Kawai (US Pat 5652610) discloses an ink tank, ink tank-integrated head cartridge having the tank, and ink head constructed integrally, and ink jet printing apparatus having the ink tank or head cartridge.


Also: US Pat 6390590, US Pat 6227643

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S Liang whose telephone number is (703) 305-4754. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (703) 308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

lsf LSL
November 15, 2002


John Barlow
Supervisory Patent Examiner
Technology Center 2800